

REMARKS

This Amendment, submitted in response to the non-final Office Action dated April 17, 2008, is believed to be fully responsive to the points of rejection raised therein. Accordingly, entry of the Amendment and favorable reconsideration on the merits is respectfully requested.

Claims 1-10, 12-17, and 23 -26 are pending. Claims 12 and 13 are amended above to correct informalities. New claims 23-26 are added above. No new matter has been added, and support for the amendment can be found, for example, in Figures 5 and 6 and in paragraphs [0022] and [0023] of the present application. Claims 1-10 and 12-17 have been rejected under 35 USC 103(a) over EP 0526057 (Schilling). Applicants respectfully submit the following remarks in support of the patentability of the claims.

Claim 1 is directed to a fan blade and recites a plurality of fiber composite layers and a plurality of high elongation fiber composite strips joining one of the fiber composite layers at a joint. The high elongation fiber composite strips include a first high elongation fiber composite strip having fibers oriented in a first direction and a second high elongation fiber composite strip having fibers oriented in a second direction different than the first direction.

Schilling is directed to a composite fan tip configuration comprising a plurality of first thin successive layers of a first composite material (20) and a plurality of second thin successive layers of a second composite material (21) having a different modulus of elasticity than that of the first layers. (Abstract) As noted by the Examiner, Schilling does not disclose a first high elongation fiber composite strip having fibers oriented in a first direction and a second high elongation fiber composite strip having fibers oriented in a second direction different than the first direction, as recited by Claim 1. Applicants respectfully submit that one skilled in the art would not have modified Schilling in the manner proposed by the Examiner on page 3 of the April 17, 2008 Office Action, in view of the purpose and teachings of Schilling.

The present invention is directed to preventing fiber breakage in composite fan blades (also referred to as increasing fracture resistance in the present application). See,

for example, paragraphs [0002], [0017] and [0027]. In contrast, the purpose of Schilling's patent was to prevent the layers from separating from each other (delaminating). See, for example, the Abstract. Applicants determined that fiber orientation of the elongation strips was a relevant factor in increasing fracture resistance and thus have included fiber orientation as part of their claimed embodiments.

However, Schilling does not teach that fiber orientation is a result-effective variable for controlling delamination or for any other purpose. In fact, Schilling does not appear to discuss fiber orientation. Regarding the Examiner's comments on page 3 of the April 17, 2008 office action, that "the reference does show in Figure 2 that the strips join the first and second thin composite layers," Applicants wish to note that Figure 2 of Schilling shows a set of thin successive layers of a first composite material (20) and a set of successive thin layers of a second composite layer (21), which are joined by joining material (23). (Abstract) Accordingly, it is unclear what the Examiner is referring to by the term "strips" in this statement. Regardless, Applicants respectfully disagree with the next statement on page 3 of the Office Action that "[t]he first and second composite layers are in different orientation from each other." Applicants have carefully reviewed Schilling, and Schilling does not discuss fiber orientation. In fact one of the materials listed in Schilling as a suitable composite material is Titanium, which would have no fiber orientation. The Examiner appears to be relying on the different patterns used in the figures to distinguish the first and second composite materials (20, 21). However, Applicants respectfully submit that there is no suggestion in Schilling that the patterns used are intended to represent fiber orientation. Rather, the patterns merely appear to provide a means for distinguishing the two materials (20, 21) visually.

Applicants also wish to address the Examiner's contention that "it would have been obvious to one of ordinary skill in the art to have the plurality of joining material strips oriented in different directions in order to have areas of higher distributed shear loads for a higher strength fan blade." (Page 3 of the April 17, 2008 Office Action) First, this argument ignores the fact that Schilling does not discuss fiber orientation or suggest that fiber orientation is a result-effective variable. Further, this argument neglects that fact that Schilling does not teach that fiber orientation is relevant to "hav[ing] areas of higher

distributed shear load.” On the contrary, Schilling reduces delamination during exposure to high sheer loads by positioning the weakest shear plane towards the blade surface. (Summary of invention) Schilling accomplishes this by having the second material (Schilling’s Material 22) be (a) longest at one surface and gradually decreasing towards the other surface (Schilling’s Figure 2), (b) longest at the surfaces and gradually decreasing towards the interior (Figure 3 of Schilling), or (c) shortest at the surfaces and gradually decreasing (Figure 4 of Schilling).

In view of the above, Applicants respectfully submits that one skilled in the art would not have modified Schilling in the manner proposed by the Examiner, based on the teachings and purpose of Schilling. Accordingly, Claim 1 is patentably distinguishable over Schilling. As Claims 2-10, 12-17 and new claims 23-26 depend from claim 1, these arguments apply with equal force to Claims 2-10, 12-17, and 23-26. In addition, Applicants submit the following remarks to further distinguish the dependent claims from Schilling.

Claim 12 depends from Claim 1 and further recites that the first direction is 45 degrees relative to a spanwise direction of the fan blade. Claim 13 depends from Claim 12 and further recites that the second direction is parallel to the spanwise direction of the fan blade. Claims 12 and 13 are amended above to correct informalities noted by Applicants. Given that Schilling does not discuss fiber orientation, Applicants respectfully submit that the specific, recited directions of Claims 12 and 13 are not obvious. Applicants respectfully submit that claims 12 and 13 are further patentably distinguishable over Schilling for this additional reason.

Claim 14 depends from Claim 1 and further recites that the high elongation fiber composite strips include a third high elongation fiber composite strip having fibers oriented in a third direction different than the first direction and the second direction. Given that Schilling does not discuss fiber orientation, Applicants respectfully submit that the recited third high elongation fiber composite strip having fibers oriented in a *third direction different than the first direction and the second direction* is not obvious.

Claim 15 depends from Claim 14 and recites that the first direction is 45 degrees relative to a spanwise direction of the fan blade, the second direction is parallel to the

spanwise direction of the fan blade, and the third direction is -45 degrees relative to the spanwise direction of the fan blade. Given that Schilling does not discuss fiber orientation, Applicants respectfully submit that the specific, recited directions of Claim 15 are not obvious. Applicants respectfully submit that claims 14 and 15 are further patentably distinguishable over Schilling for these additional reasons.

New Claim 23 depends from claim 1 and further recites that a plurality of fiber composite layers are interposed between respective ones of the high elongation fiber composite strips, such that at least a plurality of the high elongation fiber composite strips are not contiguous. Claim 24 depends from Claim 23. One non-limiting example of this arrangement is illustrated in Figure 6 and discussed in paragraph [0023]. This non-contiguous arrangement was designed to prevent fiber-breakage. However, Applicants believe that this arrangement would not further the purpose of Schilling, namely preventing delamination. Accordingly, Applicants respectfully submit that Claims 23 and 24 are patentably distinguishable over Schilling.

New Claim 25 depends from Claim 1 and further recites that ends of the high elongation fiber composite strips are staggered such that a length of at least one of the high elongation fiber composite strips differs relative to the respective length of other ones of the high elongation fiber composite strips, and the lengths of the high elongation fiber composite strips do not monotonically increase or monotonically decrease as position from said first outside surface increases. Claim 26 depends from claim 25. One non-limiting example of this arrangement is illustrated in Figure 5 and discussed in paragraph [0022]. This staggered arrangement was designed to prevent fiber-breakage. However, Applicants believe that this arrangement would not further the arrangement of Schilling, namely preventing delamination. Accordingly, Applicants respectfully submit that Claims 25 and 26 are patentably distinguishable over Schilling.

Accordingly, Applicants respectfully request that the rejections of Claims 1-10 and 12-17 under 35 USC 103(a) over Schilling be withdrawn.

In view of the above, Applicants respectfully submit that all of the pending claims, namely Claims 1-10, 12-17, and 23-26 are in condition for allowance.

CONCLUSION

In view of the foregoing, Applicants respectfully submit that the application is in condition for allowance. Favorable reconsideration and prompt allowance of the application are respectfully requested.

Should the Examiner believe that anything further is needed to place the application in even better condition for allowance, the Examiner is requested to contact Applicants' undersigned representative at the telephone number below.

Respectfully submitted,

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